

What is claimed is:

1. A torque device for applying torque to a rotatable member,
comprising:

a housing;

5 an inner ring assembly defining a torque axis upon which torque is to be
applied, said inner ring assembly including at least one pin eccentrically
disposed relative to said torque axis and an engaging structure coaxially
disposed relative said torque axis for engaging said rotatable member;

said housing rotatably accepting said inner ring assembly to permit
10 rotation about said torque axis;

a movable member disposed in said housing to move along a travel path
to come into and out of engagement with said at least one pin when said inner
ring assembly rotates relative said housing to rotate said at least one pin along a
circumferential path of travel about said torque axis and relative to said housing;

15 said movable member having a slanted face slanted relative to a tangent
to an intersection of said circumferential path of travel of said at least one pin
and the travel path of said movable member thereof such that continued rotation
in a first direction of said inner ring assembly, relative to said housing, engages
said slanted face with said at least one pin and urges said movable member

outward relative to said torque axis to a disengagement point where said slanted face moves out of engagement with said at least one pin; and

an adjustable biasing device for biasing said movable member toward said at least one pin such that said inner ring assembly applies a predetermined level of torque to said rotatable member at said point of disengagement.

2. The torque device of claim 1 wherein said movable member is a sliding member slidably disposed in said housing.

3. The torque device of claim 2, wherein:

said adjustable biasing device includes a split ring spring;

said housing defines a slide notch for slidably accepting said sliding member; and

said housing further defines a circumferential opening accepting said split ring spring such that said split ring spring is disposed around said inner ring assembly and an inner circumference of said split ring spring engages a sliding member end of said sliding member, opposing said slanted face, to apply bias to said sliding member to engage said at least one pin with said slanted face.

4. The torque device of claim 3, wherein said split ring spring is integral with said sliding member.

5. The torque device of claim 3, wherein:

said biasing device includes a ring segment spring having first and second ends, the ring segment spring being disposed in said circumferential opening radially outside of said split ring spring with said first and second ends engaging an outer circumference of said split ring spring at first and second points; and

said biasing device further includes a threaded member threaded into said housing and disposed to adjustably apply pressure to said ring segment spring such that said first and second ends of said ring segment spring apply adjustable pressure to said first and second points on said outer circumference of said split ring spring.

6. The torque device of claim 5, wherein said at least one pin is rotatably disposed in said inner ring assembly.

7. The torque device of claim 3, wherein said at least one pin includes a plurality of pins circumferentially disposed in said inner ring assembly.

8. The torque device of claim 7, wherein said plurality of pins are rotatably disposed in said inner ring assembly.

9. The torque device of claim 1 wherein said movable member is a pivoting member pivotably disposed in said housing.

5 10. The torque device of claim 9, wherein:
said adjustable biasing device includes a split ring spring; and
said housing further defines a circumferential opening accepting said
split ring spring such that said split ring spring is disposed around said inner
ring assembly and an inner circumference of said split ring spring engages a
10 pivotal member end of said pivoting member, opposing said slanted face, to
apply bias to said pivoting member to engage said at least one pin with said
slanted face.

11. The torque device of claim 10, wherein:
said biasing device includes a ring segment spring having first and
15 second ends, the ring segment spring being disposed in said circumferential
opening radially outside of said split ring spring with said first and second ends

engaging an outer circumference of said split ring spring at first and second points; and

said biasing device further includes a threaded member threaded into said housing and disposed to adjustably apply pressure to said ring segment such that said first and second ends of said ring segment spring apply adjustable pressure to said first and second points on said outer circumference of said split ring spring.

12. The torque device of claim 10, wherein said at least one pin is rotatably disposed in said inner ring assembly.

13. The torque device of claim 10, wherein said at least one pin includes a plurality of pins circumferentially disposed in said inner ring assembly.

14. The torque device of claim 13, wherein said plurality of pins are rotatably disposed in said inner ring assembly.

15. The torque device of claim 1 further comprising:

a guide pin disposed in said housing;

said housing defining a slide notch for slidably accepting said movable member;

said movable member being a sliding member slidably disposed in the slide notch defined by said housing and said sliding member having a

5 longitudinal slot aligned along a sliding axis of said sliding member;

said guide pin being disposed within said longitudinal slot;

and said slide notch being configured to restrict sliding movement of said sliding member to a linear path when said rotation of said inner ring assembly is rotated relative said housing in the first direction and configured to permit

10 rotation of said sliding member about said guide pin by engagement of the at least one pin with the sliding member with rotation of the inner ring assembly in a second direction, opposite said first direction, such that disengagement of said sliding member with said at least one pin is permitted by continued rotation of said inner ring assembly in said second direction thereby effecting ratcheting
15 operation of said inner ring assembly relative to said housing.

16. The torque device of claim 15, wherein:

said adjustable biasing device includes a split ring spring;

and

said housing further defines a circumferential opening accepting said split ring spring such that said split ring spring is disposed around said inner ring assembly and an inner circumference of said split ring spring engages a sliding member end of said sliding member, opposing said slanted face, to apply bias to said sliding member to engage said at least one pin with said slanted face.

17. The torque device of claim 16, wherein:

said biasing device includes a ring segment spring having first and second ends, the ring segment spring being disposed in said circumferential opening radially outside of said split ring spring with said first and second ends engaging an outer circumference of said split ring spring at first and second points; and

said biasing device further includes a threaded member threaded into said housing and disposed to adjustably apply pressure to said ring segment such that said first and second ends of said ring segment spring apply adjustable pressure to said first and second points on said outer circumference of said split ring spring.

18. The torque device of claim 17, wherein said at least one pin is rotatably disposed in said inner ring assembly.

19. The torque device of claim 16, wherein said at least one pin includes a plurality of pins circumferentially disposed in said inner ring assembly.

5 20. The torque device of claim 19, wherein said plurality of pins are rotatably disposed in said inner ring assembly.

21. The torque device of claim 1, wherein said adjustable biasing device includes a threaded member and a compression spring with said threaded member disposed to adjustably apply force to said compression spring which in
10 turn applies said bias to said movable member.

22. The torque device of claim 2, wherein said adjustable biasing device includes a threaded member and a compression spring with said threaded member disposed to adjustably apply force to said compression spring which in turn applies said bias to said sliding member.

23. The torque device of claim 9, wherein said adjustable biasing device includes a threaded member and a compression spring with said threaded member disposed to adjustably apply force to said compression spring which in turn applies said bias to said pivoting member.

24. A torque device for applying torque to a rotatable member,
comprising:

a housing;

an inner ring assembly defining a torque axis upon which torque is to be
5 applied, said inner ring assembly including at least one first engaging surface
eccentrically disposed relative to said torque axis and an engaging structure
coaxially disposed relative said torque axis for engaging said rotatable member;

said housing rotatably accepting said inner ring assembly to permit
rotation about said torque axis;

10 a movable member disposed in said housing and having a second
engaging surface disposed to move along a travel path to come into and out of
engagement with said at least one first engaging surface when said inner ring
assembly rotates relative said housing to rotate said a least one first engaging
surface along a circumferential path of travel about said torque axis and relative
15 to said housing;

said first and second engaging surfaces being disposed to effect
engagement along a surface path slanted relative to a tangent to an intersection
of said circumferential path of travel of said first engaging surface and a path of
travel said movable member in a moving direction thereof such that continued
20 rotation in a first direction of said inner ring assembly, relative to said housing,

engages said second engaging surface with said at least one first engaging surface and urges said movable member outward relative to said torque axis to a disengagement point where said second engaging surface moves out of engagement with said at least one first engaging surface; and

5 an adjustable biasing device for biasing said movable member toward said at least one first engaging surface such that said inner ring assembly applies a predetermined level of torque to said rotatable member at said point of disengagement.

10 25. The torque device of claim 24 wherein said movable member is a sliding member slidably disposed in said housing.

26. The torque device of claim 25, wherein:

said adjustable biasing device includes a split ring spring;

said housing defines a slide notch for slidably accepting said sliding member; and

15 said housing further defines a circumferential opening accepting said split ring spring such that said split ring spring is disposed around said inner ring assembly and an inner circumference of said split ring spring engages a sliding member end of said sliding member, opposing said second engaging

surface, to apply bias to said sliding member to engage said second engaging surface with said at least one first engaging surface.

27. The torque device of claim 26, wherein said split ring spring is integral with said sliding member.

5 28. The torque device of claim 26, wherein:

 said biasing device includes a ring segment spring having first and second ends, the ring segment spring being disposed in said circumferential opening radially outside of said split ring spring with said first and second ends engaging an outer circumference of said split ring spring at first and second points; and

10 said biasing device further includes a threaded member threaded into said housing and disposed to adjustably apply pressure to said ring segment spring such that said first and second ends of said ring segment spring apply adjustable pressure to said first and second points on said outer circumference of said split
15 ring spring.

29. The torque device of claim 28, wherein said second engaging surface is a surface of a pin is rotatably disposed in said sliding member and said at least

one first engaging surface is a surface disposed at an incline relative to a radial direction of said inner ring assembly.

30. The torque device of claim 24 wherein said movable member is a pivoting member pivotably disposed in said housing.

5 31. The torque device of claim 30, wherein:
said adjustable biasing device includes a split ring spring; and
said housing further defines a circumferential opening accepting said
split ring spring such that said split ring spring is disposed around said inner
ring assembly and an inner circumference of said split ring spring engages a
10 pivotal member end of said pivoting member, opposing said second engaging
surface, to apply bias to said pivoting member to engage said second engaging
surface with said at least one first engaging surface.

 32. The torque device of claim 31, wherein:
said biasing device includes a ring segment spring having first and
15 second ends, the ring segment spring being disposed in said circumferential
opening radially outside of said split ring spring with said first and second ends

engaging an outer circumference of said split ring spring at first and second points; and

said biasing device further includes a threaded member threaded into said housing and disposed to adjustably apply pressure to said ring segment such that said first and second ends of said ring segment spring apply adjustable pressure to said first and second points on said outer circumference of said split ring spring.

33. The torque device of claim 32, wherein said second engaging surface is a surface of a pin is rotatably disposed in said sliding member and said at least one first engaging surface is a surface disposed at an incline relative to a radial direction of said inner ring assembly.

34. The torque device of claim 31, wherein said second engaging surface is a surface of a pin is rotatably disposed in said sliding member and said at least one first engaging surface is a surface disposed at an incline relative to a radial direction of said inner ring assembly.

35. The torque device of claim 24, wherein said adjustable biasing device includes a threaded member and a compression spring with said threaded

member disposed to adjustably apply force to said compression spring which in turn applies said bias to said movable member.

36. The torque device of claim 25, wherein said adjustable biasing device includes a threaded member and a compression spring with said threaded member disposed to adjustably apply force to said compression spring which in turn applies said bias to said sliding member.

37. The torque device of claim 30, wherein said adjustable biasing device includes a threaded member and a compression spring with said threaded member disposed to adjustably apply force to said compression spring which in turn applies said bias to said pivoting member.

38. A cable assembly comprising a cable, an threaded connector having a rotatable threaded member, and said torque device of claim 1 wherein said rotatable threaded member is said rotatable member and said engaging structure is fixed to said rotatable member.

39. The cable assembly of claim 38 wherein said engaging structure and said rotatable member are integral.

40. A cable assembly comprising a cable, an threaded connector having a rotatable threaded member, and said torque device of claim 24 wherein said rotatable threaded member is said rotatable member and said engaging structure is fixed to said rotatable member.

5 41. The cable assembly of claim 40 wherein said engaging structure and said rotatable member are integral.

 42. An electrical instrument comprising a threaded connector having a rotatable threaded member, and said torque device of claim 1 wherein said rotatable threaded member is said rotatable member and said engaging structure
10 is fixed to said rotatable member.

 43. The electrical instrument of claim 42 wherein said engaging structure and said rotatable member are integral.

 44. An electrical instrument comprising a threaded connector having a rotatable threaded member, and said torque device of claim 24 wherein said
15 rotatable threaded member is said rotatable member and said engaging structure is fixed to said rotatable member.

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45. The electrical instrument of claim 44 wherein said engaging structure and said rotatable member are integral.